User's Manual

Wind/Solar Hybrid Controller

Please Read This User Manual Carefully Prior to Installation and Operation of This Product.

2014 V1.0

Notices

1） **Battery reverse-connection is forbidden.**

2） Battery virtual connection or damage is one main factor of malfunction. Please check battery voltage and connection status weekly, clear rust on positive, negative terminal in time; use lead terminal if available.

3） If the malfunction is not easy to eliminate or reason unclear, please write down the phenomenon in detailed record, and contact manufacturer for help in time.

Installation Environment

1） The equipment should be installed indoor where is well-ventilated.

2） Avoid exposing the apparatus under direct sunshine, exposure, rain, moist, acid mist and dust.

3） Allow at least 20 inches (0.5 m) distance from battery.

4） Ambient Temperature is -20～+55℃; Ambient Humidity is 35～85%RH, no condensing.

5） **Do not install the equipment in a compartment with flammable liquids, such as gasoline, or explosive vapors. Be ware of the flame and the spark.**

1. General Description

The wind/solar hybrid controller is an intelligent control device which can control wind turbine and solar panel at the same time, specially designed for high-end wind/solar hybrid system and also suitable for wind/solar hybrid power system and wind/solar hybrid monitoring system. It is used to control the wind generator and solar panel to charge the batteries safely and efficiently.

With decent appearance, easy operation, visual LCD display and perfect protection functions, the apparatus has high charge efficiency, low no-load loss.

The wind/solar hybrid controller is the core component of the off-grid power generation system. The performance of the controller will impact the life and the stability of the whole system, especially the lifespan of battery banks.

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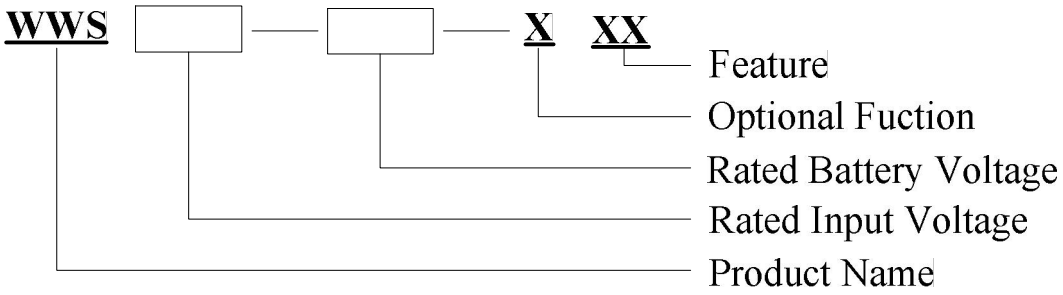
2. Model Specification



Product Name		Rated Input Power		Rated Battery Voltage		Optional Function		Feature	
WWS	Wind solar hybrid controller	**06**	0.6 kW	**24**	24V	**N**	Normal	**00**	Normal
		10	1kW	**48**	48V	**L**	Low Voltage Charge	**01**	RS232
		20	2kW	**96**	96V	**D**	Buck oltage Charge	**02**	RS485
		30	3kW	**120**	120V	**B**	Economic	**04**	Solar Dumpload Separately
		50	5kW	**220**	220V	**S**	Micro-current Charge	**10**	Wind Turbine Single Phase DC
		100	10kW	**240**	240V			**11**	RS232 Wind Turbine Single Phase DC, RS232
		200	20kW					**12**	RS485 Wind Turbine Single Phase DC, RS232
								XX	Other

Remark: Micro-current Charge Function is only available for system no more than 3kW Power running with Battery Banks no more than 48V.

E.G.: WWS20-48-L01 Rated Output Power: 2kW

Rated Battery Voltage: 48V

With Low Voltage Charge and RS232 communication function

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3. Performance Description

- **Reliability：** Intelligentized, modularized design, simple mechanism, powerful functions. With industrial range superior components and strict production technology, the controller can be used in relatively bad working environment and has reliable performance and long life-span.
- **PWM Stepless Dumpload Mode:** dump residual power with division into thousands of stages. It can dump residual power while charging battery banks, which is benefit to effectively extend battery longevity.
- **Voltage Limiting and Current Limiting Charge Mode:**
  When battery voltage exceeds the pre-set floating voltage point, the controller will adopt PWM voltage limiting charge mode. It dumps the excess energy. When wind turbine charging current exceeds pre-set brake current point, the controller will automatically start brake to protect battery banks.
- **LCD Display Function:** LCD screen can display system status and parameters via visual digital and graphic form. Such as: battery voltage, wind turbine voltage, PV voltage, wind turbine current, PV current, wind turbine power, PV power, battery power status etc.
- **Perfect Protection Functions:** Battery over charge protection, Battery over discharge protection, Battery anti-reserve connection protection, wind turbine current-limiting charge, automatic brake, manual brake; solar anti-reverse charge protection, solar anti-reverse connection protection, lightning protection, etc.

(**Note: Following optional functions are valid only for controllers which have these functions**)

- **Optional Remote Communication Function:**
  The software can monitor real-time system running status, which contain all the parameters on the LCD screen. Through the software, users can not only set and adjust relevant parameters, but also can control the wind turbine and load running status, and alarm while malfunction happens.
- **Optional Low Voltage Charge Function:**
  Boost module is added in the controller to help wind turbine charge battery banks even in low wind or the wind turbine rotates in low speed. User can adjust the admittance value and start charge voltage via software according to different wind turbine parameters.

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- **Optional Dry-contact signal Function:**

  When the battery is reaching setting value, the controller will automatically output dry-contact signal.

- **Optional Temperature Compensation Function:**

  The controller can adjust the unload voltage according to different ambient temperature so that the battery charge is in the best efficiency.

- **Optional SD card Function:**

  With SD card, controller store system history data when the controller disconnected with PC.

- **Optional Wind Speed Detection Function:**

  The controller can detect real-time wind speed when it is matched with appointed anemometer. User can read the real-time wind speed via monitoring software.

- **Optional Micro-current Charge Function:**

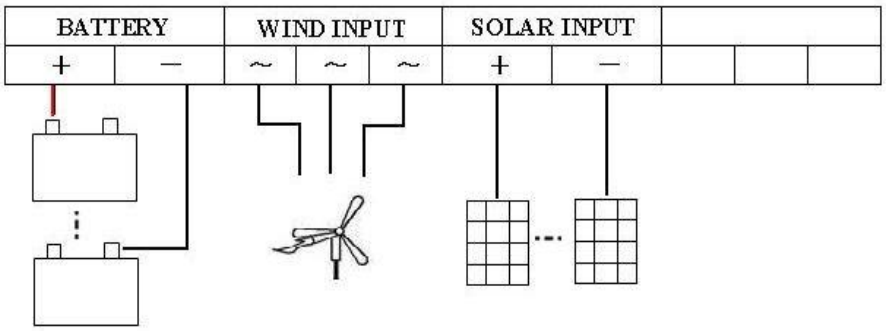
  When the wind turbine input voltage reaches to the pre-set value, the controller will produce the micro-current charge for the battery.

- **Optional Wind Turbine Rotate Speed Detection Function:** User can read the real-time wind turbine rotate status via monitoring software.

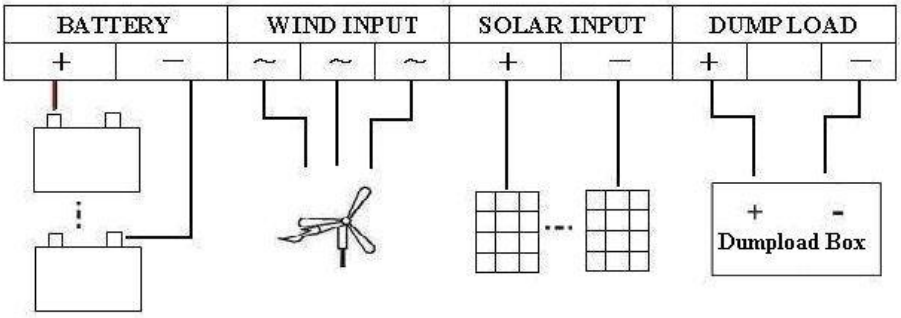
- **Optional DC Output Function:** DC output offers power for DC load, with various control modes for choice, including: Constant on; Constant off; Constant half-power; light-control on, light-control off; light-control on, time-control off; light-control on, time-control half-power, light-control off; light-control on, time-control half-power, time-control off. Via LCD buttons, users can set three output control modes: constant on; light-control on, light-control off; light-control on, time-control off.

4. Installation Flow

Remark: Users should connect according to the following corresponding connection:



PIC A



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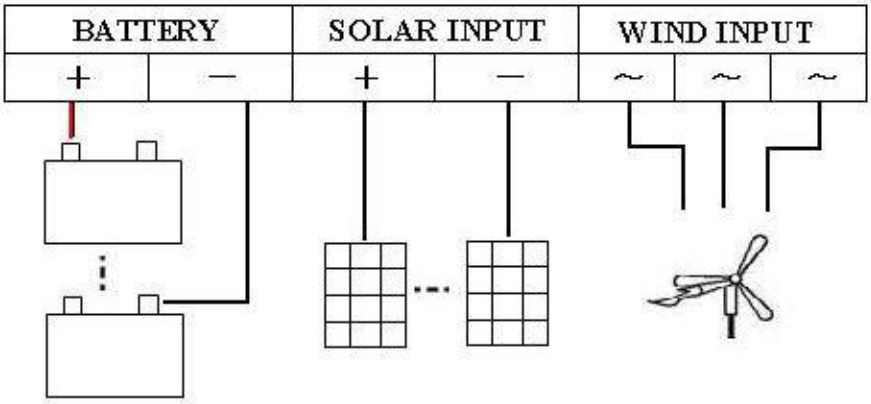

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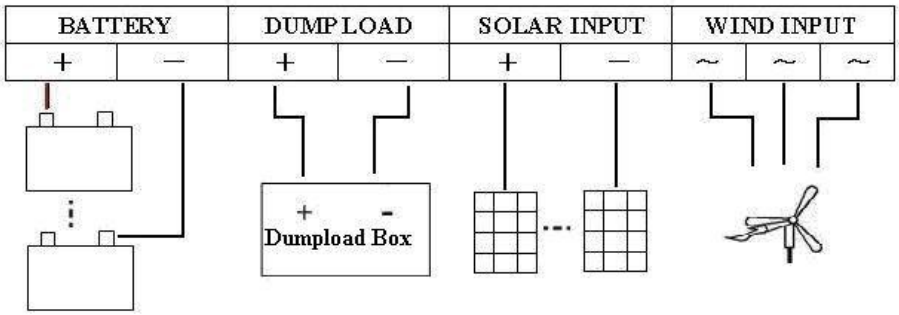


PIC D

User should connect and operate all parts according to following procedures after wind turbine, solar panel and external circuit constructions are finished.

Step 1. Check the package and then check the controller for damage after unpacking. Damaged controller cannot be installed in the system.

Step 2. For controller whose dumpload box is separated, please connect dumpload box to the "DUMP LOAD" terminals of the controller.

Step 3. Connect battery positive pole to the positive (+) "BATTERY" terminal, Connect battery

negative pole to the negative (-) "BATTERY" terminal with copper core cable.

(**Note: Although the controller has anti-reverse connection protection function, wrong polarity of battery shall be forbidden! Please refer to Appendix I for copper wire over current capability**.)

Step 4. Connect the wind turbine output lines to the "WIND INPUT" terminals in condition of wind turbine in action-less or low speed.

Step 5. Connect solar panels to the "SOLAR INPUT" terminals.

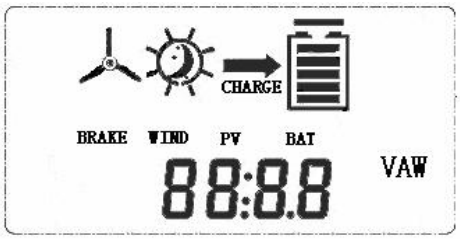
Step 6. Check all connection is proper and firm or not.

Step 7. If the controller has communication function, user can read and set relevant parameters via software.

Step 8. User can set relevant parameters through LCD buttons.

5. LCD Display Instruction and Button Specification

5.1 LCD Display Instruction



1) Wind turbine symbol.

2) Day symbol. Night symbol.

3) Battery symbol，inner strip graph indicates the battery power status. Five inner horizontal strips display indicates the battery is full. The symbol shall be flashing when the battery is over-discharge, flashing will not stop until battery voltage recover. The symbol shall be flashing when the battery is over charge, flashing will not stop until battery voltage recover.

4) 88:88 Parameters display symbol. Each system parameters are displayed via visual digit and graph.

5) Press the "Enter" key and "Esc" button at the same time, LCD displays the symbol BRAKE which indicates wind turbine in brake status. Wind turbine will stop rotating or running in

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low speed under brake status. Press the "Enter" key and "Esc" button at the same time under brake status, the symbol BRAKE will disappear and brake status is released. In normal situation, the wind turbine shall be in running status rather than brake status.

5.2 Button Specification

LCD backlight will be on after pressing any button. The backlight will go out to save power if there is no button operation for 10 seconds.

✧ "↑(+)": Up/ Increase. In browsing status, press ↑(+) to check the previous parameter. In setting window, press this button to check the next adjustable parameter or increase the value of current parameter.

✧ "↓(-)": Down/Decrease. In browsing window, press ↓(-) to check the next parameter. In setting window, press this button to check the previous adjustable parameter or decrease the value of current parameter.

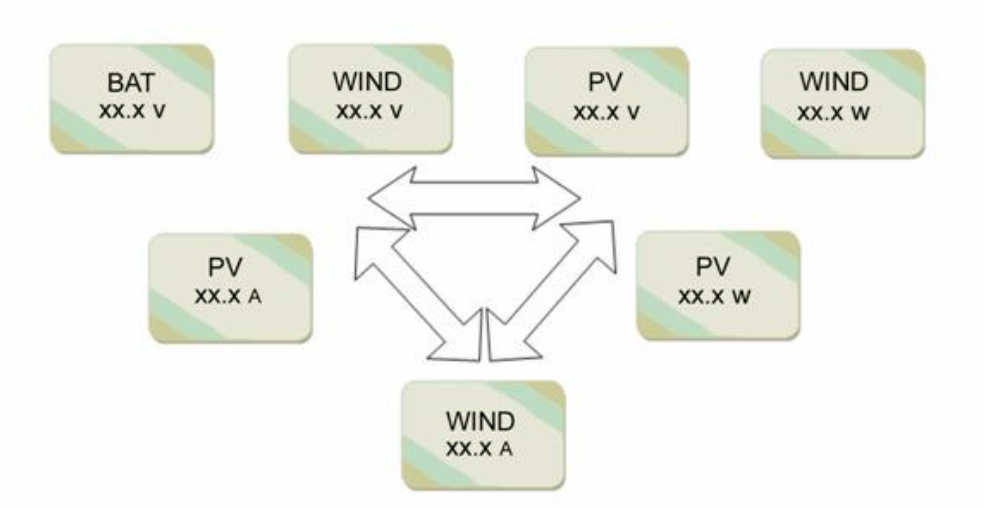
✧ "Enter": Set/Confirm. In browsing window, press "Enter" to access setting window. In setting window, press this button to save parameters and return back to browsing window.

✧ "Esc": Cancel/Manual reset. In setting window, press "Esc" to return to browsing window without saving the modified parameters.

5.3 Parameters Browsing

1） When power is on, the LCD is under browsing window and displays battery voltage: XX.X V;

2） In browsing window, LCD will circularly display the following parameters by pressing "↑(+)" button and "↓(-)" button.



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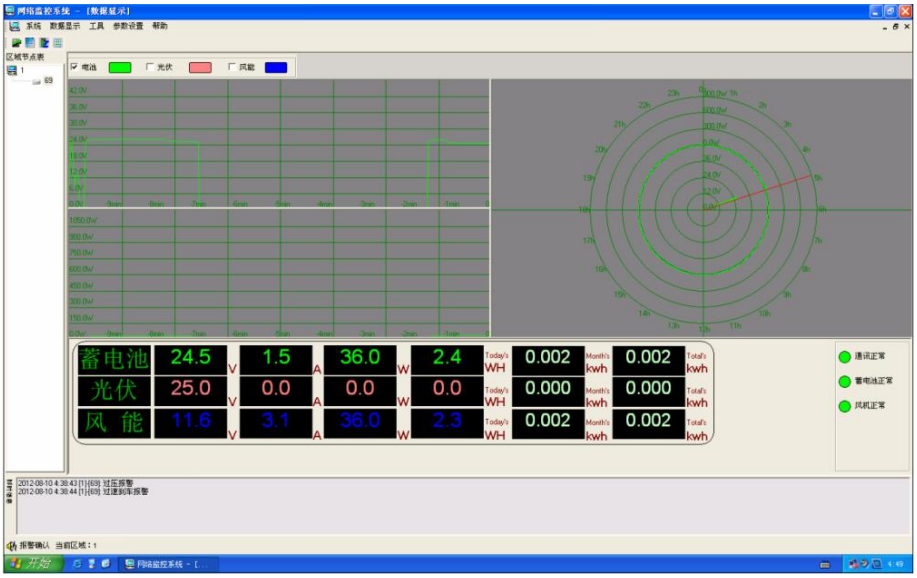
6. Monitoring Software (Optional)



The monitoring software is specially developed for the controllers that we produced, the following are the part functions which can be realized via the software, more information please refer to our software user manual.

a) Remote monitoring and parameters configuration for different controller models.

b) Big database system capacity.

c) The controller can network according to RS482 bus, GPRS, Ethernet.

d) History data Inquiry.

7. Technical Data

Parameters		WWS06-48-B	WWS10-48-B		WWS10	
Rated Battery Voltage（V）（V_B）		48			24	48
Rated Wind Power (kW) P_W		0.6	1		1	1
Dimensions (L ×W ×H) (mm)		205×150×82			424×423×170	
Low Voltage Charge Function	Admittance Value（Factory Default）	5/60	/		10/15	10/60
	Wind Turbine Start Charge Voltage (Factory Default) (V)	8	/		4	8
	Dimensions (L ×W ×H) (mm)	220×150×82	/		423×305×170	

Parameters	WWS20				
Rated Battery Voltage（V）（V_B）	48	96	120	220	240

Rated Wind Power(kW)P_W		2				
Dimensions (L ×W ×H) (mm)		424×423×170				
Low Voltage Charge Function	Admittance Value (Factory Default)	10/30	10/150	10/150	5/300	
	Wind Turbine Start Charge Voltage (Factory Default) (V)	8	20	20	40	
	Dimensions (L ×W ×H) (mm)	423×305×170				

Parameters		**WWS30**				
Rated Battery Voltage（V）（V_B）		48	96	120	220	240
Rated Wind Power(kW)P_W		3				
Dimensions (L ×W ×H) (mm)		523×423×170				
Low Voltage Charge Function	Admittance Value (Factory Default)	10/30	10/150	10/150	5/300	5/300
	Wind Turbine Start Charge Voltage (Factory Default) (V)	8	20	20	40	40
	Dimensions (L ×W ×H) (mm)	423×305×170				

Parameters		**WWS50**				
Rated Battery Voltage（V）（V_B）		48	96	120	220	240
Rated Wind Power(kW)P_W		5				
Dimensions (L ×W ×H) (mm)		423×305×170				
Low Voltage Charge Function	Admittance Value (Factory Default)	10/30	5/75	5/75	5/300	5/300
	Wind Turbine Start Charge Voltage (Factory Default) (V)	8	20	20	40	40
	Dimensions (L ×W ×H) (mm)	423×305×170				

Parameters		**WWS100**			**WWS200**	
Rated Battery Voltage（V）（V_B）		120	220	240	220	240
Rated Wind Power(kW)P_W		10			10	
Dimensions (L ×W ×H) (mm)		423×305×170			423×305×170	
Low Voltage Charge Function	Admittance Value (Factory Default)	5/75	5/300	5/300	5/300	5/300
	Wind Turbine Start Charge Voltage (Factory Default) (V)	20	40	40	40	40
	Dimensions (L ×W ×H) (mm)	423×305×170			423×305×170	

Note: The specific size to prevail in kind, / means no such product.

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Maximum Wind Turbine Input Power(W)	$1.5P_W$
Rated Solar Input Power(W)	$P_W \times 3/10$
Floating Charge Voltage(V)	$V_B \times 14.5/12$
Wind Turbine Brake Current(A)	P_W/V_B
Dumpload Control Mode	PWM
Display Mode	LCD
Quiescent Current	≤20mA
Ambient Temperature & Humidity	-20～+55℃/35～85%RH（Without Condensation）
Communication Function (Optional)	RS232 、RS485、 RJ45、 GPRS (Optional)
Temperature Compensation Function(Optional)	-4mV/℃/2V ,–35℃～+80℃ , Precision：±1℃
In order to serve our customers better, our company can adjust parameter configuration according to customer's requirement.	

8. Troubleshooting

If your phenomenon is out of following descriptions or should you have any problems about these products, please contact manufacturer in time.

Phenomenon	Troubleshooting
The symbol flashing, without charge or discharge	Battery is over-voltage, check battery voltage, and whether the cables are well-connected or not, re-connect all components.
LCD display "BRAKE" all the time	a) Firstly, open the software "parameter"-"control", please check if the setting is "BRAKE". If yes, please cancel it. b)Secondly, Disconnect wind turbine, battery with controller successively. Reconnect them a few minutes later, then check if it comes back to normal.

9. Guarantee and Liability

One year warranty is available for our product from the date of delivery. If the product is out of warranty or damaged by transportation, inappropriate operation, human factors, force majeure, no guarantee is made.

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Appendix

Appendix I: Copper Wire Over Current Capacity

Wire Diameter（mm²）	Over current capability（A）	Wire Diameter（mm²）	Over current capability（A）
4	≤20	16	≤90
6	≤30	25	≤125
10	≤50		

Appendix Ⅱ: Dump load Box Dimension

Product No.	Dumpload box Dimension (L ×W ×H)（mm）
WWS10	410×230×175 (24V System)
	300×190×120 (48V System)
WWS20	410×430×175
WWS30	540×430×175
WWS50	770×390×180
WWS100	520×430×675
WWS200	680×420×675
Note: The specific size to prevail in kind.	

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